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ABSTRACT

This report is designed to help teachers and supervisors in teaching the New York State Elementary Syllabus in kindergarten through grade two. The curriculum emphasized a hands-on inquiry approach, and included both science process skills and content objectives. This is a report of the Comprehensive Instructional Management System (CIMS)-Science Program during the 1988-89 school year in three school districts. Implementation efforts focused on introducing the program to participating schools and assisting staff in using the curriculum and assessment materials. This involved support form central CIMS, district personnel, and school personnel. Cited as strengths were the CIMS-Science curriculum's hands-on approach, specificity, flexibility, and accessibility to teachers without strong science backgrounds. Criticism focused on the unavailability of manipulative materials and inadequate coverage or omission of some science topics. Based on the findings, six recommendations are made. (YP)

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# OREA Report

## EVALUATION SECTION REPORT

## Comprehensive Instructional Management System (CIMS) Science 1988-89

SE051 333

EVALUATION SECTION
John Schoener, Chief Administrator
February 1990

# EVALUATION SECTION REPORT

## Comprehensive Instructional Management System (CIMS) Science 1988-89

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## EVALUATION SUMMARY

The Comprehensive Instructional Management System (CIMS)-Science program is designed to help teachers and supervisors in teaching the New York State Elementary Syllabus in kindergarten through grade two. It was administered by the Office of Program and Curriculum Development (O.P.C.D.), which piloted the program for the first time during the 1988-89 school year. The curriculum emphasizes a hands-on inquiry approach to learning, and is based on an organized sequence of science process skills in conjunction with content objectives in life science, earth science, and physical science. The program also includes a listing of suggested instructional materials, and a guided study kit to help teachers assess each student's mastery of science process skills. There are also written tests of science content for grade two.

Three community school districts piloted CIMS-Science during the 1988-89 school year--C.S.D.s 8, 17, and 25. Each district targeted five schools that would implement the program in all kindergarten, grade one, and grade two classes.

The major objectives of the CIMS-Science program for 1988-89 were to:

- provide support to district-level and school supervisors in instructional leadership;
- support teachers in developing flexible science instructional plans based on the needs of students;
- train specialists, such as science cluster teachers, to take on a supportive role to teachers and to serve as resource persons;
- implement an approach that emphasizes children's contact with a wide range of phenomena, and the strategies they need to gather information and formulate perceptions about relationships that exist around them; and
- meet the key goals stated in the New York State Elementary Science Syllabus.

Among the major findings were the following:

- Half of the teachers reported receiving the CIMS-Science curriculum manual by the end of December 1988, and nearly a fifth received it in February or March. Distribution of the guided study kits began during the spring 1989 semester. A majority of teachers reported having the kits by the end of March, although approximately 40 percent received them between April and June.

- Most teachers reported receiving help in using the manual and guided study kits, although the usefulness of this assistance was rated more positively in the case of the kits than the manual. Problems in using the manual centered largely around the unavailability of the manipulatives necessary for a hands-on approach to teaching science.

- The turnkey training model adopted in C.S.D.s 17 and 25 to help teachers in using the study kits met with mixed results. The CIMS liaisons in some schools reported that science cluster teachers or assistant principals attended central CIMS workshops and subsequently gave in-school presentations and demonstration lessons. In other schools, individuals selected as turnkey trainers did not get release time to provide such support. Other problems with this staff development strategy included the selection of individuals lacking staff development experience, and the refusal of principals to release the same individuals to attend all CIMS training sessions, with consequent fragmentation in the turnkey training.

- All teachers reported using the curriculum manual, and nearly half said that they had covered between 50 and 75 percent of the specified objectives; most believed that the CIMS-Science objectives are appropriate for the grade level they teach and that the manual was useful for teaching the New York State elementary science curriculum. A majority of teachers who received the kits reported using them. Overall, they found the observational techniques useful for assessing students' strengths and weaknesses, but claimed that the program's late start precluded reteaching. Those teachers who did not use the kits explained that they had received them too late in the school year. District science coordinators noted that CIMS-Science is structured yet flexible, and gives teachers without strong science backgrounds more confidence in teaching this subject.

- The extent of support provided by the schools varied, but district science coordinators, school liaisons, and teachers generally agreed that more ongoing, practical in-school support was needed.

## RECOMMENDATIONS

Based on these findings and other information presented in this report, the following recommendations are made:

- In order to assist teachers in using the CIMS-Science program, districts and schools need to find ways of increasing their levels of in-school support; this might include having science cluster teachers serve as resources

to classroom teachers rather than as providers of instruction, and providing time for staff development activities and collaborative planning. Given problems encountered in obtaining substitute teachers, one way to provide coverage and encourage cooperation among classroom teachers might be to pair teachers who would periodically cover each other's classes, share information, and otherwise assist each other in implementing science lessons.

- To further assist teachers without strong backgrounds in science, staff development activities should focus more on science content and the integration of science with other subjects. This should include more demonstration lessons with opportunities for role playing, and in-classroom observations with follow-up discussions.

- To promote more effective follow-up assistance to teachers, efforts undertaken during 1988-89 to involve district science coordinators and school supervisors in central CIMS training activities should be continued, and to the extent possible, expanded. This might be accomplished by securing commitments from superintendents and principals to mandate such attendance and provide the necessary released time.

- If turnkey staff development models are to be used, more rigorous selection criteria for turnkey trainers should be developed. Also, principals must provide time for these individuals to attend central CIMS training activities and to assist their colleagues. As the program expands, if district and school resources are not adequate to support turnkey training, CIMS-Science staff should consider implementing CIMS in fewer schools, but providing more initial on-site assistance. Limiting the number of newly participating schools would also accelerate the distribution of curriculum materials and initiation of staff development sessions earlier in the school year.

- Revised editions of the teacher's manual should take into account the suggestions of users--e.g., include additional science topics, cover certain content areas in greater depth, provide more student worksheets with improved illustrations, synchronize topics with the seasons of the year.

- Given the importance of manipulative materials to the program's hands-on approach, program staff, in collaboration with district and school administrators, need to explore alternate ways of making these more readily available. This might include establishing networks among teachers for sharing materials or modifying lessons in ways that take the paucity of supplies into account.

## ACKNOWLEDGMENTS

This report is the result of a collaborative effort on the part of full-time staff and consultants. In addition to those whose names appear on the title page, the unit is grateful to the following people for their able assistance: Maria Cheung, Meryl Schildkraut, and Sandra Kraskin.

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# I. INTRODUCTION

## PROGRAM DESCRIPTION

The Comprehensive Instructional Management System (CIMS)-Science Program is designed to help teachers and supervisors in teaching the New York State Elementary Science Syllabus in kindergarten through grade two. The curriculum, which emphasizes a hands-on inquiry approach to learning, is based on an organized sequence of science process skills--e.g., observing, classifying, measuring, estimating, predicting--in conjunction with content objectives in life science, earth science, and physical science. Each area of study is contained in an instructional module. These disciplines are studied throughout all grade levels, but address different topics and increasingly sophisticated problem-solving skills. The program also includes a listing of suggested instructional materials, and an assessment component comprised of written end-of-module tests (grade two only) and performance-based tests, designed to assess student mastery of the content and process objectives, respectively. To assist teachers in assessing the development of students' science process skills, the CIMS program includes a "guided study kit" (including appropriate manipulative materials), whereby teachers observe each student's performance on various direct experience activities; the results are to be used to modify instruction in view of students' strengths and weaknesses.[1]

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[1] The program also includes a computerized test scoring and reporting system that was not implemented during 1988-89.

CIMS-Science was piloted in three community school districts during the 1988-89 school year--C.S.D.s 8, 17, and 25--each of which targeted five schools that would implement the program in all kindergarten, grade one, and grade two classes.

## PROGRAM OBJECTIVES

The major objectives of the CIMS-Science program for 1988-89 were to:

- introduce CIMS-Science in five pilot schools in each of three community school districts;
- provide support to district-level and school supervisors in instructional leadership;
- support teachers in developing flexible science instructional plans based on the needs of students;
- train specialists, such as science cluster teachers, to take on a supportive role to teachers and to serve as resource persons;
- implement an approach that emphasizes children's contact with a wide range of phenomena, and the strategies they need to gather information and formulate perceptions about relationships which exist around them; and
- meet the key goals stated in the New York State Elementary Science Syllabus.

## SCOPE OF THE EVALUATION

The evaluation of the CIMS-Science Program by the Office of Research, Evaluation, and Assessment/Instructional Support Evaluation Unit (OREA/I.S.E.U.) focused on the nature and extent of the program's implementation, the assistance provided to teachers in the use of the curriculum and assessment components, and participants' evaluation of both the program and the strategies adopted to support it.

## EVALUATION PROCEDURES

The following served as data sources in evaluating the CIMS-Science Program:

- project documents and memoranda describing program objectives, components, and staff development plans;
- curriculum materials;
- interviews with the CIMS assistant directors, the three district science coordinators, and the CIMS liaisons (administrators or supervisors) in a sample of three out of five schools in each district regarding the program's implementation, their respective roles and responsibilities, and reactions to the program;
- questionnaires mailed to teachers using CIMS-Science (in the same sample of schools chosen for liaison interviews) regarding their use of the program, the assistance they received in implementing it, and their assessment of it.

## SCOPE OF THIS REPORT

This report of the CIMS-Science Program consists of four chapters. Chapter I presents an overview of the program, the scope of this evaluation, and the evaluation procedures. The implementation strategies are described in Chapter II. Findings, based largely on participants' perceptions, are reported in Chapter III. Conclusions and recommendations are included in Chapter IV.

## II. PROGRAM IMPLEMENTATION

The approach to implementing the CIMS-Science Program was a cooperative one, entailing the active participation and support of central CIMS program staff, the districts, and the schools. Following is a description of the respective responsibilities of these groups in carrying out major program activities.

STAFF DEVELOPMENT

The CIMS assistant directors, who were responsible for overall program planning and coordination, assigned a science curriculum leader to collaborate with the district science coordinators in supporting the program in participating schools (one day a week in each district). Initially, they made in-school presentations to introduce the program to teachers and supervisors, and explain the use of the teacher's manual. District science coordinators, who were expected to serve as liaisons between the schools and CIMS program staff, arranged and attended these staff development meetings so that they could provide follow-up assistance to the schools, as needed. School supervisors and science cluster teachers were expected to give ongoing support to classroom teachers. According to the CIMS assistant directors, the curriculum leader had introduced CIMS to all appropriate grade levels at all participating schools by the end of November 1988.

However, the resignation of the CIMS-Science curriculum leader in November 1988 meant that another strategy had to be

devised for providing continued staff development support, particularly with regard to implementation of the guided study component.* (Since no performance-based assessment was conducted prior to teaching the introductory module--which highlights the process skills to be mastered during the course of the year--teachers did not need the guided study kit until the beginning of the spring 1989 semester.)

Several alternate plans, developed by CIMS staff in collaboration with the district science coordinators, were offered to the districts. All of the proposed plans entailed the assignment of two CIMS staff members, who already had major responsibilities for the CIMS-Mathematics Program, to provide training sessions for district and school staff. (These plans are described in greater detail in Chapter III, along with the options selected by the three districts, and their experiences in executing them.)

CURRICULUM AND ASSESSMENT MATERIALS

Central CIMS was responsible for providing all participating teachers in the pilot schools with the appropriate level CIMS-Science curriculum manual, student worksheet booklets, and guided study assessment kits. CIMS was also to supply each science cluster, participating school principal, and district science coordinator with a complete set of CIMS materials for grades

*This individual could not be replaced because of a Board of Education hiring freeze.

kindergarten, one and two. All grade two teachers were to receive the written end-of-module tests, along with a scoring key and list of instructions. (There were no written tests for kindergarten or grade one.) The districts were responsible for providing schools with the hands-on instructional materials necessary for implementing the activities. Central CIMS provided the district science coordinators with a list of suggested materials.

## III. FINDINGS

### SCIENCE COORDINATORS' PERCEPTIONS

During May and June 1989, OREA staff interviewed science coordinators in the three community school districts that piloted the CIMS-Science program during the 1988-89 school year. Questions focused on the implementation of the program, and the assessment of both the curriculum materials and the support provided to teachers in using them.

All of the science coordinators had been enthusiastic about their district's decision to participate in the CIMS-Science program and had, in fact, been instrumental in winning superintendents' and, in some cases, principals' support for it. Among the reasons for this interest in CIMS-Science were the desire to upgrade science education, the need for a science curriculum manual keyed to the new state and city elementary science curriculum, and previous experience with CIMS-Mathematics or CIMS-Language Arts programs. While there was, thus, widespread support for the introduction of CIMS-Science in the pilot districts, it should be noted that in one district schools were selected to reflect the district's diversity with respect to geography (and implicitly, socioeconomic status), mathematics and reading achievement scores, and ethnicity, and not necessarily on the basis of principals' support for the program.

Since central CIMS, district, and school staff were all expected to support the implementation of this science education

program, OREA asked science coordinators about the specific roles each of these groups assumed. All of the science coordinators said that the central CIMS-Science curriculum leader made grade level presentations in all of the pilot schools during the fall/winter 1988 semester in order to introduce the curriculum manual to teachers of kindergarten and grades one and two (and other school staff--e.g., assistant principals and science cluster teachers who sometimes attended these sessions).

When the CIMS-Science curriculum leader, who was also supposed to provide assistance to schools in the use of the assessment component (the guided study kit), left unexpectedly in November 1988, CIMS offered participating districts the following staff development options: a series of CIMS-led workshops for teachers, held during or after school (with CIMS paying for substitute coverage or the contractual per session fee for participants, respectively); payment by CIMS for a district person with a strong science background to be trained by CIMS to conduct workshops in the five pilot schools one day a week; or CIMS training of science clusters, a school supervisor, or other appropriate personnel, to provide turnkey training one day a week in their own schools (with CIMS paying per session fees).

The science coordinator in C.S.D. 25 reported that the district opted to have each participating school select a site coordinator to provide on-site assistance one-half day per week. The choice of site coordinator was based on accessibility, knowledge of science, and willingness to act as a resource in the

coordinator's school C.S.D. 17 elected to have the assistant principal responsible for supervising CIMS-Science and one teacher (either a science cluster or classroom teacher of grades kindergarten, one, or two) from each school attend the after-school CIMS workshops, and for these individuals to act as turnkeys trainers in their own schools. However, according to the science coordinator in this district, some principals did not release the same group of individuals to attend all of the sessions. In addition to this lack of continuity, some of those who were selected had little staff development experience or were not familiar with the grade levels using CIMS this year.

C.S.D. 8 initially chose to have a district teacher assist the science coordinator in providing on-site support one day a week on school time, but problems in obtaining released time for this person precluded its implementation. The district then elected to have teachers attend an after-school workshop in April (one for each grade level) offered by CIMS, but attendance was poor. Finally, the district science coordinator gave an after-school workshop at the end of May 1989 for one assistant principal from each pilot school (attendance was mandated) and teachers (on a voluntary basis) on the use of the guided study kit. The assistant principal, and one teacher from each grade level (who had participated either in the central CIMS or district-led training) were to make in-school grade level presentations for teachers who had not participated in any of these staff development sessions. According to the science

coordinator in this district, the turnkey strategy was carried out in three of the five schools, although not until June. Given the problems encountered, use of the guided study kits in this district was expected to be minimal during the 1988-89 school year.

Asked about the role played by the district in supporting this project, all three science coordinators cited various responsibilities that they assumed. These included arranging for and attending CIMS-led staff development workshops, visiting schools to provide follow-up assistance as needed, and helping schools to obtain instructional materials. In addition, the coordinators said that other science staff development activities were provided in their districts, apart from those related expressly to CIMS-Science, although the amount of assistance available varied considerably from district to district--e.g., C.S.D 17 offered a science workshop as one option during three early childhood staff development days, whereas in C.S.D. 25, the superintendent provided substitute coverage for approximately 75 teachers to attend workshops at Alley Pond Park given in collaboration with Cornell University Extension.

While the CIMS program provided the curriculum manual, student worksheet booklets, written tests for grade two, and guided study kits, the districts were responsible for providing schools with the instructional materials necessary for implementing the activities. The science coordinator in C.S.D. 17 reported that although the district offered to secure these

materials, the participating schools chose to assume this responsibility themselves, using funds allotted by the district or from other school resources. C.S.D. 8 approved purchase order requests for materials on the CIMS-Science list on the basis of $50 per teacher, and supplemented this allotment with other district funds. While the schools were expected to match the district's per teacher allotment, according to the science coordinator, not all of them did so. C.S.D 25 gave the pilot schools $300 for the purchase of hands-on supplies, responsibility for ordering materials resided with the school-designated CIMS liaison, but the science coordinator offered suggestions and provided price lists.

According to the science coordinators, the extent of the support provided by schools varied from district to district, and within districts. For example, not all pilot schools had science cluster teachers, and even in those that did, their roles varied: in some instances they served as resources to classroom teachers, as well as teaching science classes; in other schools, the science cluster was not released to assume staff development responsibilities. Moreover, some assistant principals devoted more time to supervising science than others. Overall, however, the science coordinators in the pilot districts believed that more ongoing, in-school support was necessary. Other suggestions by science coordinators regarding CIMS-Science staff development included the need for demonstrations of ways to use the curriculum manual with role-playing opportunities for teachers,

and greater emphasis on integrating science with other subject areas. Also noted by two coordinators were some delays in implementing the program. In some schools the program was not implemented until December 1988 because the introductory presentations by the CIMS curriculum leader were spread over three months in 15 pilot schools.

All of the science coordinators expressed the belief that most of the kindergarten, grade one, and grade two teachers in the pilot schools in their district used the CIMS-Science curriculum manual this year, and that they covered most of the objectives, although, as one coordinator put it, "not in as great a depth as they should have."

In C.S.D.s 17 and 25, most teachers reportedly used the guided study kits; in C.S.D. 8, use of this assessment component was very limited in view of the staff development problems. One of the coordinators observed, however, that while the assessment results were a useful guide to what children knew, there was little time for reteaching, especially in view of the program's late start (i.e., in winter 1988).

Overall, the science coordinators in the three pilot districts were very enthusiastic about the CIMS-Science Program, and considered it to be extremely useful for teaching the new New York State Elementary Science Syllabus. Among the strengths they cited were the following:

- "It provides a structured, hands-on approach to teaching science."
- "The lessons are all referenced to the state syllabus."

- "It gives teachers without strong science backgrounds something they can use--like a good cookbook."
- "Teachers are now talking more with each other about science."
- "It doesn't frighten teachers--it shows them they can teach science with everyday materials."
- "Using it, teachers realize that teaching science includes teaching other subjects."
- "It makes people believe they have to teach science."
- "It can be a point of departure, especially for discussions between science cluster and classroom teachers."
- "While it is laid out step-by-step, it also gives teachers freedom to choose lessons that fit their needs."

Weaknesses identified by the coordinators focused primarily on the inadequate coverage of some science topics and the omission of others.

Asked to identify the factors that facilitated the program's implementation in their district, all three science coordinators emphasized the importance of district and school support--specifically, the need for superintendents and principals to make available school time and personnel to support various program activities (e.g., for program-related conferences and workshops, and in-school supervision), and to provide money for supplies and equipment.

As for factors that impeded the program's implementation, the coordinators mentioned problems in obtaining some of the suggested manipulative materials, the late start-up in some schools because of the three-month time frame for introducing the

program and distributing manuals to teachers, and the lack of ongoing, practical, in-school assistance.

Suggestions for providing this on-site help to teachers included increased availability of CIMS program staff (beyond the originally planned one curriculum leader for 15 schools in three boroughs), and released time for school-based staff developers or mentor teachers to attend regularly scheduled district training in CIMS-Science, who would, in turn, become science resources in the schools.

PERCEPTIONS OF SCHOOL LIAISONS

In order to learn about the implementation of the CIMS-Science Program from the vantage point of the participating schools, in spring 1989, OREA asked the district science coordinators to identify one staff person, in a sample of three out of the five pilot schools in their district, who would be most familiar with the implementation of the program in their school to participate in an OREA interview. (Schools were supposed to assign one person to serve as the CIMS-Science liaison to the district--e.g., an administrator, supervisor, or science specialist--to facilitate communication with the district science coordinator regarding implementation issues.) Liaisons in eight of the nine sample schools agreed to be interviewed. The interviews explored: the school's policy regarding science instruction, in general; the nature of the support provided by central CIMS, district, and school staff in implementing the CIMS-Science Program; the extent to which the instructional and

testing components were used; and liaisons' overall reactions to the program.

In view of the commitment and support expected from participating schools, one interview question asked the liaisons how their school came to be one of the pilot schools. Three respondents said that the principal had expressed interest in CIMS-Science, and another three indicated that the decision was made solely at the district level. Two individuals did not know how their school was selected.

To provide some context within which to understand the experiences of these schools in implementing CIMS-Science, several questions dealt with their instructional policies and teaching approaches. All but one of the respondents reported that science is taught for two to three 45-minute periods per week; the other liaison said that three to five 50-minute periods were the norm. Science cluster teachers served the three grade levels piloting CIMS-Science in all but one school, but the nature and extent of their responsibilities varied considerably. In five schools, the classroom teacher assumed primary responsibility for science instruction, while the cluster teacher assumed a supplementary role. In these schools, the classroom and cluster teachers met during lunch or preparation periods to coordinate their activities. In one school, the cluster teacher was responsible for science instruction and the role of the classroom teachers was undefined. Cluster and classroom teachers both taught science lessons in another school, but did not plan

collaboratively. In the last school, the cluster teacher served primarily as a resource person, teaching only when needed and making occasional visits to classrooms.

OREA asked the school liaisons specifically what school staff were involved in introducing the CIMS-Science curriculum to teachers and assisting them in implementing it. Science cluster teachers were identified in most cases: six schools sent clusters to central CIMS presentations; and two of the six liaisons specifically noted that these cluster teachers subsequently served as turnkey trainers, giving demonstration lessons or making presentations at grade conferences. Five school liaisons reported that their assistant principals attended CIMS workshops, and in two instances, acted as turnkeys, in their school. Only one liaison indicated that the school principal attended any workshops. Attendance by teachers at these school-based staff development sessions was mandatory in all pilot districts.

With regard to district support, all eight liaisons acknowledged the involvement of the science coordinator in staff development sessions, and all said that the district provided materials, although these were not always considered sufficient.

All liaisons reported that school staff attended the staff development sessions conducted by the central CIMS-Science curriculum leader in fall 1988--in most cases, this included science clusters and assistant principals, as well as teachers of kindergarten, and grades one and two.

Two districts (17 and 25) chose the turnkey model offered by CIMS to assist schools in implementing the guided study component. According to the school liaisons, this staff development plan worked well in C.S.D. 17, where the science clusters who attended central CIMS sessions subsequently made presentations at grade conferences in their schools and were available to help teachers individually.

In C.S.D 25, the results were mixed. One school liaison reported that the science cluster teacher provided training for kindergarten and grade one teachers (grade two teachers attended district training); the liaison in another school claimed that while some staff attended CIMS staff development, these individuals did not subsequently train their peers.

Interviewees from C.S.D. 8 were vague in reporting who attended sessions, and if, or how, these people shared what they had learned in their schools. Liaisons' responses reflected the district's problems in choosing and carrying out a plan for assisting teachers in using the study kits.

Asked about the extent to which teachers in their schools used the CIMS-Science Program, all but one liaison interviewed said that all of the teachers used the curriculum manual. In general, no grade level differences were noted in the use of the curriculum. Except for C.S.D. 8, respondents believed that the study kits were used, at least by some teachers, primarily for individualizing instruction and determining areas needing reinforcement. However, only two interviewees said that all

second grade teachers had used the written tests developed for that grade level; liaisons in the remaining schools were either uncertain as to their use, or confident that teachers would use the tests before the end of the school year.

Overall, five of the eight liaisons agreed that the CIMS-Science Program is useful for teaching the New York State Elementary Science Curriculum, while the others were uncertain. All but one favored continued use of the CIMS program in their school, and three hoped to see it extended to the upper grades. Suggestions for improving the program centered around improved staff development--more sessions, beginning earlier in the school year, focusing on science content--and the increased availability of manipulatives.

## ASSESSMENT BY TEACHERS

A questionnaire developed by OREA, in collaboration with the CIMS-Science assistant directors, was mailed to all kindergarten, grade one, and grade two teachers in the nine sample schools. Questions focused on the amount of time spent on science instruction and which school staff assumed responsibility for it, how and to what extent teachers used the CIMS-Science curriculum and assessment components, the assistance they received in implementing the program, and their perceptions of the program's strengths and weaknesses.

Sixty-one teachers returned questionnaires, representing a response rate of 37 percent. Nearly half of the respondents

(46 percent) taught kindergarten in 1988-89, 36 percent taught first grade, and 23 percent taught second grade.* A majority (57 percent) had taught elementary level students for 10 years or more; 28 percent had taught them from two to four years; 12 percent had from five to seven years of experience; and two teachers reported having just finished their first year of teaching.

When asked how many periods of science instruction per week their students received this year, 79 percent of the teachers reported two or three periods, 16 percent said their students received four or five periods, and five percent claimed that they devoted only one period to science.

The use of science cluster teachers and other science specialists in some schools raises questions about their roles in science instruction and the nature of their interaction with classroom teachers. Consequently, one questionnaire item asked what school staff provided science instruction, and what percentage of the total instructional time each provided. Approximately one-half of the respondents (51 percent) reported sharing instructional time with a science cluster, with classroom teachers providing, on average, 59 percent of that time. Slightly less than half (46 percent) of the teachers claimed that they provided all of the science instruction, whereas only two individuals reported that the science cluster teacher alone was

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*Total is greater than 100 percent because of multiple responses.

responsible for teaching science. Of the 33 teachers who worked with a science cluster, 12 answered an open-ended question that probed how they shared the responsibility or coordinated their instructional plans. Respondents made a distinction between sharing responsibilities and simply dividing them: seven said that they coordinated their activities; and five said they taught different lessons, but without planning together.

Several questions explored teachers' use of the CIMS-Science teacher's manual. Of the 52 teachers who indicated when they received the manual, only 10 percent had it by the end of October; half had received it by the end of December. Close to one-third (31 percent) received the manual in January, leaving nearly a fifth (19 percent) who received it in February or March 1989.

Most respondents (80 percent) reported receiving help in using the CIMS manual, usually from the district science coordinator (reported by two-thirds of the teachers). Other sources of assistance were central CIMS staff (reported by 38 percent) and school-based personnel--specifically, school supervisors (15 percent), teacher-trainers (15 percent), and science cluster teachers (10 percent).* An open-ended question sought descriptions of this assistance. Most respondents (83 percent) said they received help in the form of workshops or demonstrations. Ratings of the assistance were fairly evenly

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*Total is greater than 100 percent because of multiple responses.

divided, with 54 percent answering that it was "minimally" or "not at all helpful," and 46 percent saying it was "very" or "moderately helpful." All twelve participants who had not received assistance with the manual said that no help was available in their schools.

The teacher's manual included suggested hands-on materials which could be used in teaching the curriculum. More than three-quarters (78 percent) of the respondents claimed that these materials were not readily available in their schools. An open-ended question asked about the effects this had on the teaching of the science curriculum. Most (80 percent) of the twenty-five individuals who responded to this question either adapted (n=9) or omitted (n=5) lessons, or used their own or their colleagues' hands-on materials (n=13).

About one-third of the participants used the CIMS-Science manual as the main curriculum, and another third used it equally with another text. Of the remaining third, half used only CIMS, while the other half used it as a supplement to another text. No teachers reported that they didn't use the CIMS manual.

The CIMS-Science curriculum prescribes that certain objectives be covered at each level. Nearly half of the participants (47 percent) reported having covered from 50 to 75 percent of these objectives. Forty-one percent covered an even greater number of objectives, including 24 percent who said they had covered all of them. Only 12 percent of the respondents claimed to have covered less than half of the objectives. Asked

to rate the appropriateness of the CIMS-Science curriculum objectives for the grade levels they teach, respondents gave a positive response, with 79 percent say that the objectives were "very" or "moderately appropriate," and the remainder (21 percent) rating the objectives "minimally" or "not at all appropriate." Of those giving a positive rating (n=46), 18 explained that the objectives were easy to understand and relevant.

Another question asked participants to evaluate the manual's overall usefulness for teaching the New York State science curriculum objectives for the grade levels they teach. A majority (65 percent) found the manual "very" or "moderately useful," and some of these individuals cited the manual's specificity (n=4), flexibility (n=1), and good organization (n=1) as reasons for their responses. Reservations about the manual's usefulness in teaching New York State science objectives included poor organization (n=5) and inadequate background information for teachers (n=3). The importance of staff development is underscored by the finding that teachers' assessment of the usefulness of the manual was highly correlated with their rating of the assistance they received in using it ($p \leq .01$). Of the 34 teachers who commented on difficulties they encountered in teaching the CIMS-Science content and process skills, nearly three-quarters (71 percent) singled out the lack of manipulatives. Thirteen percent maintained that they had no problems. The rest did not answer this question.

Another component of CIMS-Science curriculum is the student worksheet booklet. Most teachers (86 percent) reported using the worksheets. Among 17 individuals who commented on the worksheets' usefulness, six felt that there should be more worksheets, and another six pointed out that illustrations were poor or too small. Four teachers explained that they did not use the worksheets either because they never received them or received them too late in the school year.

A series of questions dealt with teachers' use of the guided study kit. Most respondents (85 percent) had received the kit. (Five of the eight teachers who did not receive the kit were from C.S.D. 8.) Of those (n=46) who indicated when they received it, one-third reported having it by the end of February, and more than half (59 percent) by the end of March. A significant proportion (41 percent) received this program component between April and June. Of those who received this assessment component, 71 percent said they had gotten help in using it, primarily from school-based teacher trainers (reported by 34 percent of the respondents). Other sources of assistance included district science coordinators (23 percent) and central CIMS staff (17 percent). More than three-quarters (77 percent) of the teachers receiving assistance rated it "very" or "moderately helpful." Nearly all of those who claimed they did not receive assistance (n=15) explained that none was available.

Several questions dealt with the application of the guided study kit. Among the 52 teachers who received the kit, more than

two-thirds (69 percent) reported using it with their students; those who did not use it most frequently said that they received the kit too late. Three-quarters were able to use the kit to assess the performance of all the children in their classes. Respondents rated the observational techniques presented in the study kit: 85 percent rated the techniques useful, while 15 percent found them of little or no use. Asked for what specific purposes they used assessment results, teachers mentioned the following: testing process skills (n=4); checking mastery of objectives (n=4); determining strengths and weaknesses (n=4); and reteaching (n=5).

Grade two teachers were asked whether they administered the written tests provided for this grade level. Of the 11 (out of 14) who answered, six said "yes" and five said "no." Two teachers who did not administer the tests gave explanations: one did not have the tests; the other did not complete teaching the curriculum. A final item asked teachers to comment on the appropriateness of the second grade tests in terms of the curriculum objectives and the reading level of their students. Four second grade teachers agreed that the tests followed the manual's objectives. One teacher, who did not use the tests, maintained that they were too difficult.

Responding to an open-ended question, 31 teachers offered opinions on the strong points of the CIMS-Science curriculum. Among the strong points most frequently cited were: the teacher's manual (29 percent); the student worksheets

(26 percent); the hands-on approach (26 percent); the assessment component (19 percent); and, the curriculum's organization (19 percent). Although teachers generally applauded the curriculum's hands-on approach, nearly two-thirds (65 percent) of these respondents believed that CIMS-Science relied too heavily on the use of manipulatives, in view of their lack of availability. Other weak points cited were the teacher's manual (29 percent), which was characterized as cumbersome and not synchronized with the seasons of the year; an insufficient number of student worksheets (29 percent); and poor pacing (23 percent).

Asked whether or not they would continue to use CIMS-Science next year if given a choice, approximately two-thirds (64 percent) of all respondents said they would, and gave the hands-on approach, good organization, and comprehensibility as their reasons. However, this overall affirmation of the program was not expressed by teachers in C.S.D. 25, where most said they would not choose to use it next year. Teachers on C.S.D. 17 were the most enthusiastic, with more than 85 percent endorsing its continued implementation. Several of those who would not opt to use CIMS-Science again (n=20) cited the lack of a textbook as their reason.

## IV. CONCLUSIONS AND RECOMMENDATIONS

During the 1988-89 school year, the CIMS-Science Program was piloted in three community school districts--C.S.D.s 8, 17, and 25. Each district targeted five schools that implemented the program in all kindergarten, grade one, and grade two classes. The curriculum emphasized a hands-on inquiry approach, and include both science process skills and content objectives.

Implementation efforts focused on introducing the program to participating schools and assisting staff in using the curriculum and assessment materials. This involved support from central CIMS, district, and school personnel.

A majority of teachers in the nine schools sampled believed that the CIMS-Science curriculum objectives were appropriate for the grade level they teach and that the teacher's manual was generally useful for teaching the elementary science curriculum. The district science coordinators and school liaisons agreed with this assessment. Cited as strengths were the CIMS-Science curriculum's hands-on approach, specificity, flexibility, and accessibility to teachers without strong science backgrounds. Criticism focused on the unavailability of manipulatives (which were to be provided by the districts) and inadequate coverage or omission of some science topics.

Use of the guided study kit was limited, largely because of problems encountered in providing staff development on the use of this assessment component and delays in its distribution to

participating teachers--particularly in C.S.D. 8, where many teachers never received it. Those teachers who did use the kit generally found the techniques useful for assessing student mastery of key science process skills, although some said that the delay in receipt of the kit left little time in the school year to use test results as a guide to instruction.

With regard to staff development in use of the CIMS-Science program, most teachers reported getting help with the manual, primarily from district science coordinators but also from central CIMS staff. Ratings of the usefulness of this assistance were mixed. Most of the teachers who received the study kit said they got assistance with using it, largely from school-based teacher trainers; overall, this training was judged favorably.

The extent of the support provided by the schools varied considerably--e.g., with regard to the allocation of funds for science supplies, the involvement of supervisors and science clusters in assisting classroom teachers, and the provision of released time for turnkey training and other staff development activities.

Based on these findings, and other information presented in this report, the following recommendations are made:

- In order to assist teachers in using the CIMS-Science program, districts and schools need to find ways of increasing the level of in-school support; this might include having science cluster teachers serve as resources to classroom teachers rather than as providers of instruction, and providing time for staff development activities and collaborative planning. Given problems encountered in obtaining substitute teachers, one way to provide coverage and encourage cooperation among classroom

teachers might be to pair teachers who would periodically cover each other's class, share information, and otherwise assist each other in implementing science lessons.

- To further assist teachers, and especially those without strong backgrounds in science, staff development activities should focus more on science content and the integration of science with other subjects; this should include more demonstration lessons with opportunities for role playing, and in-classroom observations with follow-up discussions.

- To promote more effective follow-up assistance to teachers, efforts undertaken during 1988-89 to involve district science coordinators and school supervisors in central CIMS training activities should be continued, and to the extent possible, expanded. This could be accomplished by securing commitments from superintendents and principals to mandate such attendance and provide the necessary released time.

- If turnkey staff development models are to be used, more rigorous selection criteria for turnkey trainers should be developed. Also, principals most provide time for these individuals to attend central CIMS training activities and to assist their colleagues. As the program expands, if district and school resources are not adequate to support turnkey training CIMS-Science staff should consider implementing it in fewer schools, but providing more initial on-site assistance. Limiting the number of newly participating schools would also accelerate the distribution of curriculum materials and initiation of staff development sessions earlier in the school year.

- Revised editions of the teacher's manual should take into account the suggestions of users--e.g., include additional science topics, cover certain content areas in greater depth, provide more student worksheets with improved illustrations, synchronize topics with the seasons of the year.

- Given the importance of manipulative materials to the program's hands-on approach, program staff, in collaboration with district and school administrators, need to explore alternate ways of making these more readily available; this might include establishing networks among teachers for sharing materials or modifying lessons in ways that take the paucity of supplies into account.